

How To ... Create Vector Arrows



Create Vector Arrows

INTRODUCTION

Vector arrows display the direction and magnitude of a vector at discrete locations in a model. Although vector magnitude can be visualized with other methods (e.g. color), important directional information is provided by the arrows.

Vector arrows have numerous attributes including length scale, tip style and size, projection, origin location, and display filters based on vector magnitude.

BASIC OPERATION

2. Click the Vector Arrows icon.

1. Select the parent part.

3. Select the vector variable to use.

4. Click Get Default to load a suitable Scale Factor.....

5. Click "Create".

Arrow Tips

To change the arrow tip shape, click the Arrow Tips button to open the Vector Arrow Tip Settings dialog:

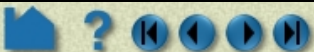
1. Select the desired tip shape from the Shape pulldown (see description at right).

2. Select a color (for Tipped shape only).

3. From the Size pulldown, select whether tip scaling is Fixed (and enter an appropriate value in the text field) or Proportional to the local vector magnitude.

Tip Shape Choices:

None	No tip (default).	
Normal	Single wedge. Good for 2D problems. Plane of the wedge is based on the relative magnitudes of the components.	
Triangles	Two intersecting triangles. Good for 2D/3D problems.	
Tipped	End of the shaft colored in a different color. Good where other shapes yield too much visual clutter.	





Other Vector Arrow Attributes

Other vector arrow attributes control the type of arrow, the location of the arrow origin, and arrow filtering options based on vector magnitude:

1. Double-click the desired vector arrow part in the parts list.

2. Select the desired type from the Type pulldown.

Choices are:

- | | |
|-------------|---|
| Rectilinear | Standard vector arrows: shaft points in local vector direction with length equal to vector magnitude scaled by Scale Factor Value. |
| Rect. Fixed | Same as Rectilinear except that length is set by Scale Factor value independent of vector magnitude. |
| Curved | Arrow shaft is the path of a particle trace in the local flow field. Scale Factor becomes "Time" and controls the duration (stopping criteria) for each trace. WARNING! This can take a great deal of time for large numbers of vector arrows and/or long Time values! |

3. Select the desired filter type from the Filter pulldown.

Choices are:

- | | |
|----------|---|
| None | No filtering – all vector arrows appear. |
| Low | Display only those arrows with magnitude <i>above</i> the value in the Low text field. |
| Band | Display only those arrows with magnitude <i>below</i> Low and <i>above</i> High (opposite of Low/High). |
| High | Display only those arrows with magnitude <i>below</i> the value in the High text field. |
| Low/High | Display only those arrows with magnitude <i>between</i> Low and High (opposite of Band). |

4. Select the desired density (0.0 to 1.0).

A density of the arrows will vary from no arrows (0.0) to arrows at every location (1.0). At intermediate densities the arrows are placed randomly.

5. Select the desired arrow origin from the Location pulldown.

Choices are:

- | | |
|----------------|--|
| Node | Arrows originate from each node of the parent part(s). |
| Vertices | Arrows originate only from those nodes that are also vertices of the parent part(s). |
| Element Center | Arrows originate from the geometric center of all elements of the parent part(s). |



ADVANCED USAGE

Although not accessible from the Vector Arrows Quick Interaction area, you can also change the projection of vector arrows and the display offset.

1. Open the Feature Detail Editor for Vector Arrows (Edit > Part Detail Editors... > Vector Arrows).

2. Select the desired vector arrow part.

3. Select the desired projection type from the Projection pulldown.

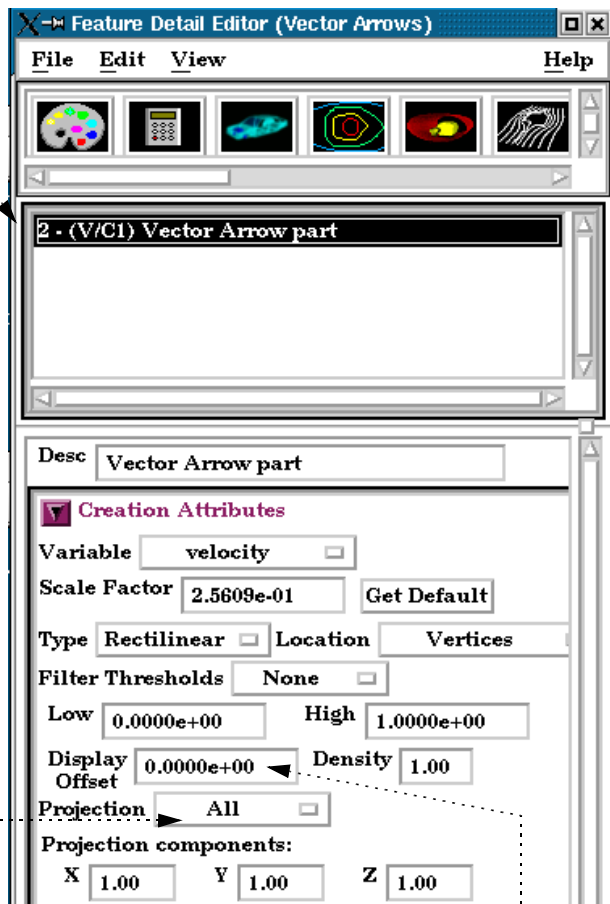
The projection choices are modified by the settings in the Projection components X,Y,Z numeric fields. These values represent a scaling factor for the component. Zero means that the component should not be considered (and therefore confine the arrows to the plane perpendicular to that axis). One is the default setting; values less than 1 diminish the contribution of the component while values greater than 1 exaggerate the contribution.

Choices for Projection are:

All	Display arrows based on the vector direction as modified by the Projection Component values.
Normal	Display arrows based on the "All" vector but in the direction of the surface normal at the arrow origin.
Tangential	Display arrows based on the "All" vector but projected tangential to the surface at the arrow origin. This is good for locating flow components perpendicular to the main flow direction (such as vortices).
Component	Display <i>both</i> the Normal and the Tangential arrows.

4. Set the desired display offset.

The display offset is used to displace the vector arrows a short distance away from the surface on which they are defined (typically for hardcopy or animation purposes). This is typically necessary when a tangential projection is used and the arrows are coincident with the parent part's surface. Note that a negative offset may be appropriate (depending on orientation).



OTHER NOTES

Vector arrows can be animated by animating the parent part (e.g. a clip plane) over space or time using flipbook or keyframe animation. See [How To Create a Flipbook Animation](#) or [How to Create a Keyframe Animation](#) for more information.

If vector arrows are created on a clip through an unstructured mesh, the resulting arrows can be difficult to visualize if the resolution of the underlying mesh varies substantially or is highly irregular. One solution is to create the vector arrows on a *grid clip* rather than the default mesh clip. See [How to Create Clip Planes](#) for more information.



Unlike most part creation operators, vector arrows are created from the client's representation of the part – not the server's. For example, if you have a clip plane that is displayed using a feature-angle or border representation, only those elements comprising the reduced display will yield vector arrows – even though all elements of the clip plane reside on the server. See [How to Change Visual Representation](#) for more information.

Vector arrows with a tangential projection can sometimes be occluded by the surface on which the arrows are defined. To solve this problem, use the Display Offset field to add a small displacement to move the arrows away from the surface. This is most useful for presentation (e.g. hardcopy or animation) output.

SEE ALSO

[Introduction to Part Creation.](#)

User Manual: [Vector Arrow Create/Update](#)